VIRGINIA WILDLIFE

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SPECIAL SMALL GAME ISSUE

Introduction

While deer hunters, numbering nearly 300,000, undeniably make up the largest single block of the Old Dominion's sportsmen, their numbers pale in comparison to the number of hunters who pursue small game. One quickly discovers that there are nearly *twice* as many small game hunters when you consider that most hunters, including deer hunters, also hunt more than one species of small game.

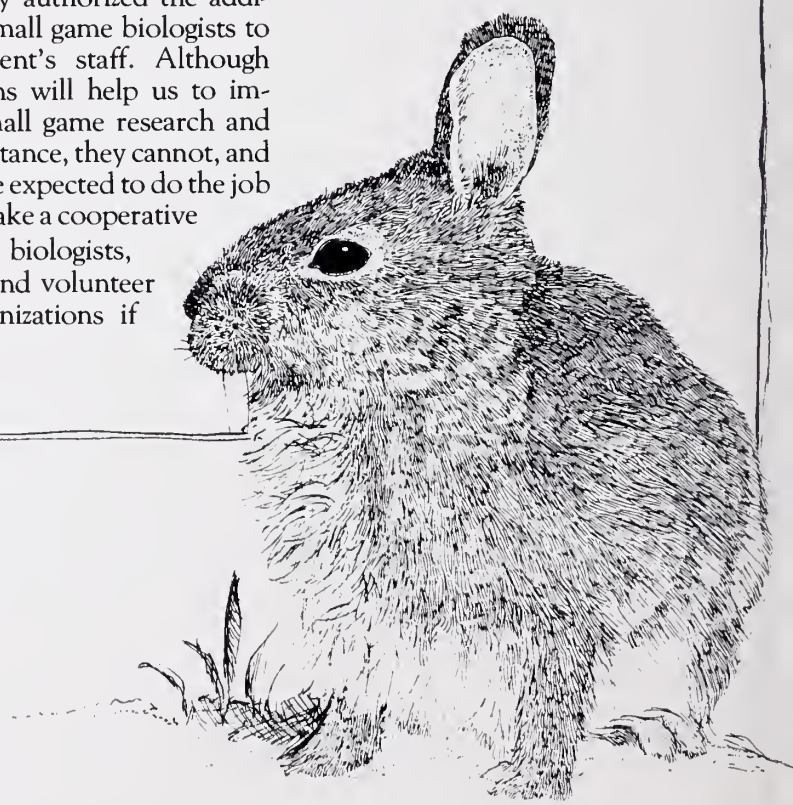
The Wildlife Division's most recent hunter survey found that nearly 600,000 hunters devoted 3.2 million days in the pursuit of small game and brought to the table an average of one species of small game for each day afield. No matter which yardstick you apply . . . recreation, fine table fare or economics . . . small game and small game hunting measures up to a lot of enjoyment for a lot of people and not a small measure of importance to Virginia's local economy.

Other than the weather, the greatest single factor affecting small game abundance annually is habitat. Although habitat conditions for some species have improved in recent years, others have declined or have been altered radically. The Department's Wildlife Division currently provides influence on less than 10 percent of the available acreage! Only 170,000 acres are owned directly by sportsmen through the Game Department's Wildlife Management Areas. The balance of affected lands is under cooperative management on National Forests, State Forests and Parks, military lands and some private non-industrial forests. The Department's only effective means of influencing wildlife values on the rest of these lands is through an aggressive educational program designed to demonstrate to landowners the how's and why's of improving wildlife habitat with little or no cost.

The 1989 Virginia General Assembly generously authorized the addition of two small game biologists to the Department's staff. Although these positions will help us to improve our small game research and technical assistance, they cannot, and should not, be expected to do the job alone. It will take a cooperative effort among biologists, landowners and volunteer sporting organizations if we are to achieve any degree of success. We pledge to do our part.

This issue of *Virginia Wildlife* focuses on small game management which we hope will stimulate your interest in small game habitat and its importance. We also hope that you will be encouraged to do what you can do *individually* on your own land or to join forces with industry, public agencies, organizations and other private landowners to give small game a helping hand. We cannot turn back the clock, but there is much that can be done. Working together we can help ensure that future Virginians will have "good old days" of small game hunting to recall.

Jack Raybourne
Director of Policy and Planning



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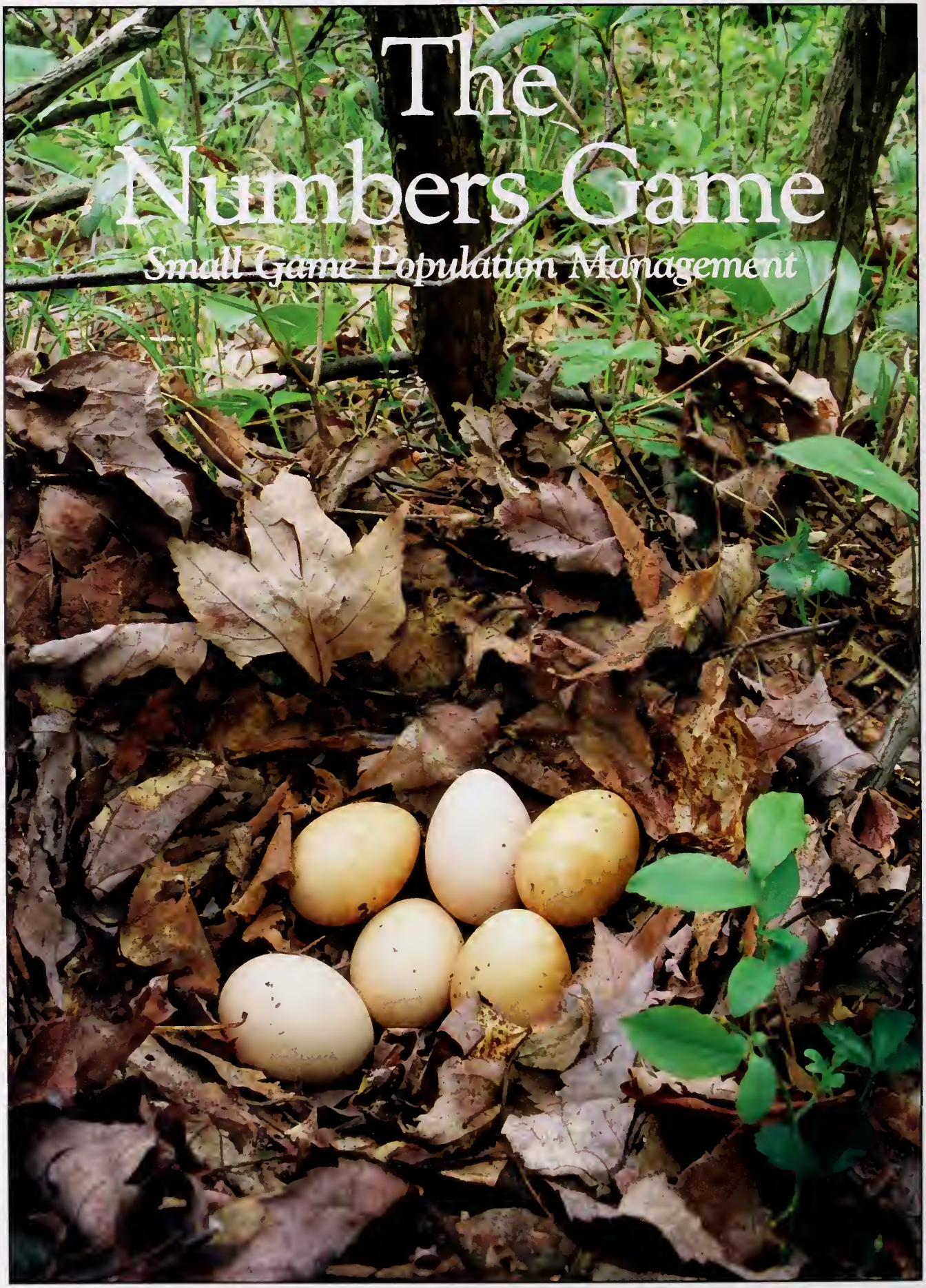
The Numbers Game

Small Game Population Management



Grouse nest with eggs; photo by Michael P. Gadomski.

by
Mike Fies

Small game management focuses on maintaining healthy and stable populations of native animals. This means that biologists must first understand what an animal needs to survive and multiply. **Above:** *Ruffed grouse on nest; photo by Joel Arrington.*

Getting a definitive answer from a wildlife biologist is like pulling the proverbial "hen's tooth." Unlike the skillful politician who avoids questions entirely, a biologist traditionally responds to public inquiry by saying that "it depends." It's not that biologists like to be uncooperative, usually it's quite the contrary. It's just that they're faced with the impossible task of understanding Nature, a challenge that man has endured since the dawn of time. Our natural world is exceedingly complex and most things in Nature really *do* depend upon something else.

The field of wildlife management has advanced tremendously in recent years, but there are still more "theories" than "laws." Current knowledge of the principles involved in small game population dynamics and the factors that influence animal numbers are certainly not exceptions. The purpose of this article is to describe what we do know about small game management and to "take a stab" at separating fact from fiction.

Population Fluctuations

One of the few "laws" of wildlife management is that no population of living creatures remains constant. Many years ago, some biologist somewhere calculated that the offspring from a single pair of flies mating in April could blanket the Earth to a depth of 27 feet by August. Thank goodness that Mother Nature insures that few flies live to reproduce! Similarly, many small game species have an enormous reproductive potential, but relatively few survive to adulthood.

The number of small game animals that occupy a given area varies seasonally from year to year. Oftentimes annual changes are slight and go undetected by a majority of sportsmen. Other times the changes are sudden and drastic, resulting in loud outcries from interested parties. It is usually during the "lean" years that state wildlife agencies are asked to explain fluctuations and to do something about them. Population fluctuations, however, are a natural "fact of life" in small game management and are many times beyond anyone's control.

The ordinary citizen today assumes that science knows what makes the community clock tick; the scientist is equally sure that he does not."—Aldo Leopold

A general pattern observed in small game populations is that they increase gradually for several years, then decline noticeably before steadily rebuilding to previous levels. This "boom or bust" pattern is almost cyclic for some species, especially rabbits. These fluctuations are often synchronized over large areas and may be unrelated to any change in habitat management practices. It is important to note, however, that population fluctuations are almost always less drastic in areas with good habitat, resulting in not only higher numbers of animals but also a more consistent population.

Under favorable conditions, annual numbers of small game animals reach their lowest point in the spring, just prior to the breeding season. From that point, the population rebounds throughout the summer and early fall as reproduction occurs and young are produced. These are the "good times" for most species, as escape cover is plentiful and the food supply is adequate. Total small game numbers peak in the fall at their "carrying capacity," the maximum number of animals that a given unit of habitat can support. In the late fall and winter, natural mortality and other pressures begin to take their toll, and populations decline. The annual cycle is then repeated the following spring.

Population fluctuations can be the result of one or many factors. Long-term increases or declines in small game numbers are usually habitat related. For example, the long-term decline in quail and rabbit populations is certainly correlated with the loss of habitat due to urbanization and changing farming practices.

Annual fluctuations, on the other hand, are usually in response to weather conditions, predation, disease, or hunting. Small game species are typically short-lived, with a life expectancy of less than two years. Annual mortality rates of 70 to 80 percent for some species are not uncommon. Fortunately, small game species are able to compensate for these heavy losses by producing large clutches or multiple litters.

Weather Influences

All animals react to weather, and small game species are certainly no exception. Precipitation, temperature, and humidity can all impact population levels, particularly when there is an excess or deficiency of any one or a combination of these factors. Populations are highest when weather conditions are favorable and lowest when the weather is extreme. Losses occur year-round and in some situations (i.e. marginal habitat) these influences can severely impact a local population.

Excessive amounts of rainfall can be detrimental to small game populations. Heavy rains can flood nests and drown young animals, especially when nests are built in ditches or other low places. Excess water can also saturate a nest to the point that the female will abandon it. Accompanied by cold temperatures, wet weather can be particularly devastating. Young animals that don't drown may develop hypothermia or become so weakened that they are susceptible to predation or disease. Adult animals, however, do not appear affected by even the heaviest of downpours.

Poor production has also been correlated with drought. Lack of rain can result in decreased amounts of suitable nesting cover as well as reduced food availability. Dry weather significantly reduces the numbers of available insects, an important food source for young quail and grouse. In the nest, egg membranes can become so dried out and tough that hatchlings have difficulty breaking out of their shell. The more strength that is required for a chick to emerge from its shell, the weaker it will be at birth. Many embryos never make it out of their shells because they don't have the strength to tear the membrane and push themselves out. Extended drought has also been shown to decrease pregnancy rates in rabbits by limiting the amount of green vegetation necessary for reproduction.

Temperature extremes can also cause problems for small game species. The intense heat that is often associated with drought may start eggs incubating before a hen has deposited her entire clutch. When this happens, a few chicks emerge early and the female leaves the nest with only a portion of her brood. The remaining embryos are left to die in the shell or be eaten by predators. Sudden changes in temperatures will also cause egg loss, particularly when the change is from hot to cold. Hot weather will start premature embryonic development while the cold weather will stop growth, causing the egg to spoil and die.

Severe winter weather can have a significant impact on adult animals. Heavy snows can result in reduced food availability, especially when the snow develops a hard crust. The length of time that the snow covers

No population of living creatures remains constant. Seasonal changes in the numbers of small game are normal, as they respond to such factors as disease, predation, and weather. Long-term declines in small game populations, however, are almost always without exception due to habitat loss—the human factor. **Above:** *Gray fox with squirrel; photo by Maslowski.* **Left:** *Bobwhite in snow; photo by Lloyd B. Hill.*

the ground is also important. In Virginia, differences in the total amounts and duration of snowfall are directly related to the observed differences in regional quail abundance. Deep snow and drifts can also reduce escape cover by burying or flattening vegetation. In areas of marginal habitat, this loss of cover can make small game animals especially susceptible to predation.

Diseases and Parasites

Diseases and parasites probably play an important role in small game population regulations, although there is very little evidence to prove this. Dead or dying animals are rarely found in the field because they are quickly consumed by a variety of predators and scavengers. Most small game animals, apparently healthy, are heavily parasitized with fleas, lice, ticks, tapeworms, roundworms, and various protozoa. In many cases, these parasites are nothing more than an annoyance and are rarely responsible for any appreciable levels of mortality.

One of the more important small game diseases is tularemia. Named after Tulare County, California, where it was first discovered, tularemia is a bacteria that can be transmitted to man. It is usually transmitted to hunters who are cleaning rabbits and is one of the few bacteria that can enter the human body through unbroken skin. Since the development of modern-day antibiotics, this disease is rarely dangerous to humans. However, tularemia is fatal to rabbits and usually appears when rabbit populations become too high. The disease is most dangerous during hot weather and has been known to cause significant rabbit die-offs. The number of documented tularemia outbreaks, however, is small.

Predation

The subject of predation and its influences on small game populations deserves considerable attention. I couldn't begin to count the number of times I have heard sportsmen complain about "the hawks, owls, and foxes killing all the game." Unfortunately, predators make con-

venient scapegoats for frustratingly low small game populations that are almost always the result of some other factor, usually habitat. Hunters often cite the recent increase in federally protected birds of prey as being directly responsible for the recent drop in many species of farm game, especially quail and rabbits. Although it's true that several species of hawks have shown recent population increases, it is also true that hawk populations are still not anywhere near what they were in 1940. Ironically, quail and rabbit populations were also much higher in 1940.

Contrary to what most outdoorsmen believe, predator populations almost never control the numbers of prey species. In fact, the opposite is true. The availability of prey animals controls the number of predators. If food is available for 10 foxes, you will likely have 10 foxes. If there is only enough food for a single fox, you will only have one. Predators have coexisted with small game animals for millions of years and have yet to wipe out a single species.

As contradictory as it may seem, predators can be beneficial to a small game population. Have you ever wondered how quail and grouse developed their superior flight abilities or how rabbits learned how to run so incredibly fast? Without predators, many of our small game species would never have evolved into such sporting game animals. Predators are also responsible for removing sick and weak animals, and helping to maintain a healthy population by limiting the spread of disease. A small game population left unchecked by predators will undoubtedly be controlled by some other factor, perhaps causing considerable harm to the entire population.

The small game literature is full of examples of how problems can arise when "varmint" control results in the elimination of a predator species. For example, when quail-eating hawks and owls were controlled on Southern plantations in the 1940s and 50s, an unforseen and destructive blacklash occurred that practically wiped out quail from certain

Since hunter harvest of squirrels usually does not affect populations, squirrel hunting seasons follow local preferences and traditions. Always, however, the first priority for setting hunting seasons is biological—in order to maintain stable and healthy populations; photo by Garry Walter.

areas. The rodent population skyrocketed and overran nests, destroying eggs and nearly eliminating all brood production. The numbers of other egg eaters such as snakes, skunks, opossums, and raccoons also increased to the point where young quail were a rare site. Plantation managers quickly learned that hawks and owls do more good than harm.

It's only fair to mention, however, that some biologists believe predators are having a more important impact on small game numbers than they used to. Deteriorating habitat conditions have resulted in "islands" of suitable habitat where once there were large expanses of good escape cover. Predators are able to hunt more efficiently and may be taking more game animals than we give them credit for. Despite this apparent problem, I know of no biologist anywhere who advocates predator control as the solution. In fact, in many rural areas, free-ranging cats and dogs probably take more quail than any of our native predators. The most effective ways to minimize predator losses are to provide adequate escape cover and to keep food plots away from areas where predators tend to concentrate.

Hunting Mortality

For many years, biologists have contended that hunter harvest had no effect on small game population levels. The idea was that hunter-killed animals would have perished from some other natural cause had they not been bagged by sportsmen. Hunter mortality was offset by a reduction in natural mortality so that the total number of small game animals surviving throughout the year remained the same, with or without hunting.

Although there is much truth to this proposition, we now know that hunter mortality can be additive to natural mortality, at least to some degree and in some circumstances. Prime small game habitat is not as plentiful as it once was, resulting in fewer areas in which sportsmen can hunt. As a result, more hunting pressure is being put on fewer animals,

*There are no shortcuts to increasing the number of small game animals in an area. If the habitat is suitable, animals like the Eastern cottontail (**above**) will be there. Photo by Jack R. Colbert.*

having a more significant impact on small game numbers than we might care to believe. In some cases, "a bird in the hand" may be worth much less "than two in the bush."

Much like habitat, small game harvest levels need to be managed. Since most small game animals reside on private properties, it is important for individual land managers to take an interest in controlling hunter pressure. Although it's nearly impossible to completely decimate a small game population, excessive amounts of hunting can reduce the number of animals available for the following season.

Setting Regulations

Determining the ideal time for small game hunting seasons has both biological and aesthetic considerations. Biologically, the season should be set to maximize the harvest of the surplus animals. Aesthetically, hunter preferences and local tradition must often be considered. Virginia's squirrel season is an excellent example of a hunting season that is based upon local preference. Since hunter harvests of squirrels usually do not affect populations, a "hodgepodge" of different seasons evolved that reflected local tradition. Some squirrel hunters preferred hunting early, when the weather was warm and the leaves were still on the trees. Others preferred to wait until late in the fall when there were fewer "warbles" (external parasites) on the squirrels and the weather was cooler. Either way, it appeared to make little difference to local squirrel populations.

For most small game species, the opening date of the hunting season generally has much less biological significance than the closing date. Harvesting animals early in the season when the surplus is at its peak has a lesser effect on the total population than at any other time of the year. By late winter, however, there is no surplus and continued harvest may have a direct effect on the following year's population. Dr. John Roseberry, noted quail biologist in Illinois, explained it well by saying that "the quail you bag in November most likely would have died of other causes, while the quail you bag in February most likely would have lived to the breeding season." As a result, most small game seasons in Virginia end around January 31.

Censusing Populations

Setting small game regulations requires a good working knowledge of population levels. Censusing small game species, however, is never easy. Quail, rabbits, and squirrels seldom hold still to be counted. Fortunately, biologists have learned that it's not necessary to know exactly how many animals we have. Much more important are population trends and changes in population age structure. Knowing whether a population is increasing or decreasing provides more useful information than knowing how many animals are in a given area at any one time. By also monitoring changes in age structure (i.e. the percentage of juveniles), population fluctuations can often be explained. The status of Virginia's small game populations is determined through spring breeding surveys, a rural mail carrier survey, and hunter surveys.

The abundance of small game animals during the breeding season is estimated each spring. Starting at sunrise, the numbers of singing quail, doves, and woodcock are counted along predetermined survey routes. Observers listen for calling birds at 10 roadside stops, approximately 1

mile apart. The number of rabbits observed while running these routes is also recorded. Good weather conditions are a prerequisite for running these surveys. In areas where ruffed grouse have been relocated into eastern Virginia, the numbers of drumming males are also counted.

A rural mail carrier survey is used to estimate midsummer populations of selected small game species. Each year, over 1,500 rural carriers are asked to count the numbers of quail, rabbits, and squirrels that they observe while delivering mail for a 5-day period in mid-August. By recording the number of juvenile animals they see, information on reproductive success is also obtained. The results of this survey are summarized regionally and have proven to be excellent indicators of upcoming fall population levels.

Several hunter surveys are also conducted to measure small game hunter success. The assumption is made that hunter success is reflective of population abundance. These annual "cooperator" surveys depend upon a selected group of volunteers to report their hunting season experiences. In Virginia, cooperator surveys are conducted for quail, grouse, and woodcock. Hunter interviews are also utilized to obtain information on doves, rabbits, and squirrels. A mail survey, conducted once every 5 years, is used to estimate the total number of small game hunters, number of days hunted, and statewide harvest.

Wing collections have been incorporated into the quail and grouse surveys. Cooperating hunters provide one wing from each bird bagged, and for grouse, also include a tail feather. The age of most game birds can be determined from wing characteristics, and the sex of grouse can be determined from the length of the central tail feather. A high percentage of juveniles in the harvest is usually indicative of a successful nesting season.

Stocking Myths

Every year, game departments across the country are besieged with requests to supplement wild small game populations with stocked animals. Although stocking sounds like an easy quick-fix solution, it simply doesn't work. Whether they are pen-raised quail, rabbits purchased from another state, or some exotic creature from a faraway place, efforts to stock these animals are destined for failure. There are no shortcuts to increasing the number of small game animals in a given area. Small game management is hard work, often time-consuming and sometimes costly. If the habitat is suitable, the animals will be there. Too often, landowners unwilling to make necessary habitat improvements forget to ask themselves why their small game populations are not as high as they should be. Stocking animals into poor habitat and expecting them to survive is nothing short of fantasy

The widespread practice of releasing pen-raised quail may be a good way to train bird dogs but it's a lousy way to increase wild populations. Pen-raised quail have a very short life span after release and usually end up as expensive food for predators. In a recent study conducted at Tall Timbers Research Station in Florida, it was found that pen-raised quail survived an average of 11 days post-release and less than one percent survived a year. Also, none of the hens that lived through the breeding season nested or produced broods. Another alternative, trapping wild birds and relocating them into suitable habitat, is usually not practical and is prohibitively expensive.

Some sportsmen advocate purchasing game animals from other states to stock in Virginia. Rabbits are often mentioned as the species we should import. This old idea has been tried repeatedly in other states, and has been abandoned by all of them. For example, between 1915 and 1951, Pennsylvania released over a million pen-raised and imported rabbits. When it was all over, there was no evidence that the rabbit population was increased by even a single animal. Ironically, Missouri exported millions of rabbits during this same time period and their population increased! These expensive lessons deserve to go unrepeated.

Perhaps the most dangerous stocking experiments involve the release of "exotic" animals that are not native to a particular area. No one can predict the outcome of these releases and guarantee that the introduced species will not become a pest, introduce a foreign disease, or compete with native animals for food resources. I wonder whose bright idea it was to bring the starling and gypsy moth to the United States?

Probably the strongest argument against stocking wild animals involves the potential for introducing disease. Pen-raised bobwhites, for example, are susceptible to avian pox and could possibly infect wild quail upon release. Hand-reared quail also serve as reservoirs for blackhead, a deadly disease affecting wild turkeys. Even worse, exotic animals can transmit foreign diseases that have serious consequences on native wildlife. Several species of Hawaiian birds are presently in danger of extinction because of foreign disease epidemics.

Not only is stocking animals like playing "Russian roulette," with the gun pointed at our native wildlife species, but it is an admission of defeat in managing native populations.

In a Nutshell

Wildlife biologists have learned about game population dynamics in recent years. We've come to realize that populations fluctuate naturally and we have determined causes for these fluctuations. We are beginning to understand the influences of weather, disease, predation, and hunting mortality on population levels. We have developed reliable population survey techniques to serve as the basis for recommending biologically sound hunting seasons. We have also learned from our past mistakes that quick-fix solutions such as stocking and predator control are not the answers they appear to be. The future of small game looks bright if we choose to put this knowledge to good use. □

Mike Fies is the small game research biologist for the Department.

All In the Family

Bobwhite chick; photo by Lloyd B. Hill.

Life history sketches of Virginia's small game.

by Irv Kenyon & Gary Norman

"*Here today and gone tomorrow*"—the life histories of small game animals are often brief-—less than a year for most individuals. Reaching their greatest abundance near each summer's end, small game populations continually decline until the next rearing season. Most losses are unavoidable, as accidents, and natural mortality from predation, disease and parasites, adverse weather, and food and cover deficiencies each take their toll. Yet, surviving small game members possess an extraordinary ability to replenish depleted populations where favorable conditions exist.

Though a short life span and the potential to rapidly recover are shared by all our small game, there are also great differences. Like all wildlife, they are a product of their surroundings, each having acquired unique physical characteristics and habits to live. Life histories are a description of those characteristics and habits, and the role they play which enables some individuals to succeed in their year-round struggle for survival. With a knowledge of life histories, we can better understand the need to maintain those environments to which each species is suited, and be better keepers of Virginia's small game animals.—I.K.

Quail

No small game species in Virginia more loudly proclaims its new beginning than the bobwhite quail. While some courtships begin before the first "bobwhite" whistle is heard, this familiar sound clearly signals that the breeding season is at hand. Usually first heard in early to mid-April, the "bobwhite" call is sounded by the male to attract a mate, stake claim to a territory, or both. Once paired, male and female bobwhites usually remain together throughout the rearing season. Quail nests are built on the ground and construction is shared by both male and female. Nest locations are typically near an opening with surrounding vegetation of grass, stemmy weeds and low-growing woody plants. A grass canopy makes the nest nearly invisible from overhead. With the nest and its location satisfactory to the hen, she will lay 12-18 eggs at a rate of about one a day. Incubation, sometimes by the male, takes 23 days. Although nesting usually begins in May, bobwhite hens are persistent and early failures may result in renesting efforts which sometimes last through September.

Newly hatched chicks, wearing natal down, leave the nest immediately after hatching to begin feeding on their own, consuming primarily small insects. During the first week to 10 days of their lives chicks will be brooded to protect them from the elements or threatening situations. Quail develop rapidly. At several days of age feathers begin to emerge and short flights are possible at two weeks. The first of two sets of juvenile feathers are completed and the distinction between male and female, by their white and buff head coloration respectively, is possible at 65 days. At 85 days, quail reach 90 percent of their adult weight, which in Virginia averages about six and a half ounces.

Quail find their greatest security in numbers, and are most often found in coveys—units of roughly 10 to 20 birds. Coveys are often formed by the combination of several broods and unattached adults. If flushed, or scattered, coveys will quickly regroup, though some members may join other nearby coveys.

Bobwhites spend virtually their entire lives concealed under low-growing vegetation, which is usually a combination of native grasses, shrubs and vines. The average home range of a covey during fall and winter is about 15 acres. Quail prefer

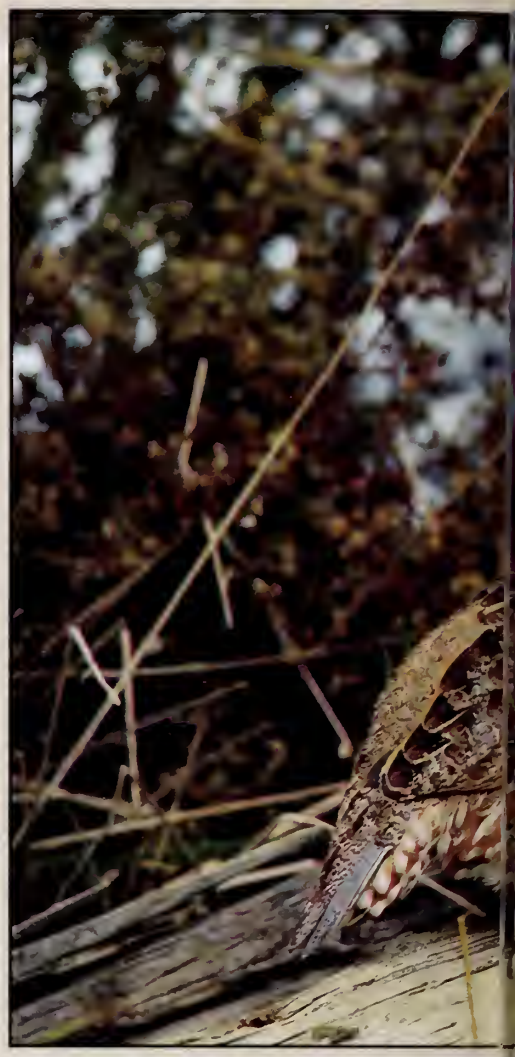


photo by Nell Bolen

The distinctive male ***(above left)*** *and female* ***(above right)*** *plumage of the bobwhite is visible by 65 days. A male and female pair usually will remain together throughout the nesting and rearing season (mid-April through September). The first breeding of the year for Eastern cottontails, on the other hand, occurs in February, and a litter* ***(pictured right)*** *is born 28 days later.*

photo by Michael Gadomski

walking to flying, and seek areas that are open at the ground to allow them to walk and find food easily. In addition to insects, quail foods include a wide array of seeds and greens. Beggarweed, ragweed, partridge pea, and lespedeza are fall and winter seed favorites.

Bobwhites remain in coveys through the winter until early to mid-spring. Longer daylight hours and warmer temperatures will trigger covey break-up. A few covey members will remain in the former home range. Others will seek new territories, as "bobwhite" calls begin to fill the countryside once more.—I.K.

Rabbits

The rabbit that jumps from a briar patch in Virginia may be one of three kinds. Most abundant statewide is the Eastern cottontail. Closely related is the New England cottontail, found only in the mountains at high elevations. The third, limited in range to extreme southeastern Virginia, is the marsh rabbit. This rabbit lacks the furry puff on its rear end that names the other two, and is smaller and darker. The varying hare, or snowshoe (not a rabbit in the strictest sense), is found only in Highland County.

Frequently preyed upon and faced with disease and parasites, it has been said that the rabbit's greatest defense is to simply outnumber its enemies with its machine-gun-like reproduction. In Virginia, the first breeding of the year occurs in February. A litter of one to eight (usually about four), naked, blind rabbits are born 28 days after breeding. Before giving birth, the female will make a nest—digging a four or five-inch depression, usually in the open, but near escape cover, and line it with grass, leaves and fur plucked from her underside. A removable cover—a mat of grass and leaves—is placed over the nest to

hide the expected young. Rabbits will open their eyes about a week after their birth and begin leaving the nest a week later. Females can reproduce at six months of age and are capable of breeding again the same day they give birth. With a breeding season that spans late-winter through early-fall, the potential exists for four or five litters per year being produced by the same doe. More often, however, successful litters will average about two a year for each female.

The cottontail's menu is almost entirely plant material, but beyond that there are few restrictions. Gardeners and orchardists may believe rabbits rely only on their plantings for food. However, the foliage, soft fruit, buds, and bark of almost every plant available are eaten by rabbits. In particular, the bark of the lowly sumac has been identified as a welcome and wholesome winter rabbit food. Rabbits also eat a form of ensilage of their own making. Greenish droppings, passed by the rabbit, which have undergone some valuable bacterial action and contain important nutrients, are re-eaten. It's probably no worse than warmed-over spinach or collard greens.

Whether playing, feeding or courting, rabbits are most active at dusk and dawn. There are also some late-night goings on, as evidenced by the frequency in which rabbits are seen scurrying in front of a pair of headlights. There is little daylight movement, however, unless disturbed.

If rapid reproduction is the rabbit's best defense against its enemies, thick cover is the next best. Actually, both are essential if rabbit populations are to survive. Rabbits will seldom be found far from if not inside, a weedy fencerow, brush pile, or other overgrown sanctuary. In reality, it is the absence of such cover that is the rabbit's greatest adversary, one which even the cottontail's potent productivity cannot overcome.—I.K.

photo by William Lea

photo by Garry Walter

*The gray squirrel (**above**) is our most common squirrel species, found throughout the state. The fox squirrel (**right**) is a larger animal with a reddish coat that prefers small woodlots or woodland edges rather than deep forests.*

Squirrels

Being out on a limb poses little threat to squirrels. Quite the contrary, trees and their spreading tops provide squirrels with a place to locate or build a comfortable tree house, to find their favorite foods, to raise young, and to travel a vast, secure and elevated transportation system.

Squirrels found in Virginia include the gray, red, fox and flying squirrel. All, however, are not game animals. Known populations of Delmarva fox squirrels, southern fox squirrels of southeastern Virginia, and northern flying squirrels are closely guarded and considered endangered. Small in size, the red squirrel and southern flying squirrel are abundant in some localities, but neither are considered game animals. Most familiar is the gray squirrel, found in suburban neighborhoods as well as the most remote oak-hickory forests throughout Virginia. The gray squirrel is this state's most popular game animal.

Fox squirrel hunting is limited to the region west of the Blue Ridge Mountains and a small segment of the northern piedmont. Here, fox squirrels are most abundant, though their numbers are usually fewer than grays. Fox squirrels prefer small woodlots or woodland edges adjoining agricultural fields and avoid extensively forested areas. Fox squirrels in western and northern Virginia can be distinguished from gray squirrels by their larger size and predominantly reddish color.

Gray squirrel populations have two distinct reproductive periods each year, although individual females may produce only one litter. Most breeding occurs in mid-winter and again in early summer, with young produced 44 days later. Average litter size is two to three young, arriving most frequently during the periods of February-March and July-August.

Like rabbits, squirrels are born with their eyes closed, hairless, and completely dependent upon their mothers. Eyes open at five weeks of age, and weaning is complete at 12 weeks.

Squirrels occupy tree cavities, or dens, during much of the year. Where tree cavities are not available, a leaf nest is sometimes constructed near the fork of a limb. For some squirrels, the leaf nest is only a "summer house" which may also serve as a summer nursery.

Well-known squirrel foods include acorns and hickory nuts. When these are not available, they feed on buds, tender twigs, bark, leaves, seeds and flowers, mostly taken from the trees in which they live. Red squirrels often eat pine cones. Squirrels have a habit of burying food for later use, with gray and fox squirrels usually storing items separately. Large caches of food are more often the sign of red squirrels. And how do squirrels remember where they stored food? Apparently they don't, relying instead on their keen sense of smell to find such treasures, which, once hidden, become the property of the first finder.

Squirrels enjoy a somewhat longer life span than most other small game, averaging about 18 months. Annual fluctuations in squirrel populations are most closely tied to their food supply. The availability of food largely determines both the survival of adults and their fitness to produce and raise young.—I.K.

Ruffed Grouse

The ruffed grouse is a bird of young forests. An active timber management program is a vital requirement for lands managed for ruffed grouse. These young forests provide the needed cover for breeding, feeding, wintering and brooding. The trend of old-aged timber stands in much of Virginia's ruffed grouse range is thought to be responsible for their gradual decline in many areas.

In Virginia, ruffed grouse numbers fluctuate from year to year, annual changes that are seen in most ground-nesting birds. Extreme weather fluctuations in the spring probably have the greatest effect on reproductive success with cold, drenching rains taking a toll on young grouse chicks. Other local cover and food conditions may contribute to population fluctuations, as well as the nutritional condition of the hens going into the spring nesting season.

A Virginia Department of Game and Inland Fisheries grouse hunter survey has found that our grouse reproductive success can vary widely, with 20 to 45 percent juvenile birds in the fall populations.

The mating season begins in early spring with the male's courtship display and drumming. Drumming serves to notify and attract females to the male's area, and is accomplished by the beating of wings and the drumming rush of air produced.

The hen grouse usually lays 11-12 eggs and incubation lasts for approximately 24 days. Male grouse do not help with incubation or brood rearing. Hatching takes place from mid-April through May.

The diet of the ruffed grouse varies considerably by season. Young chicks eat insects exclusively. Through the

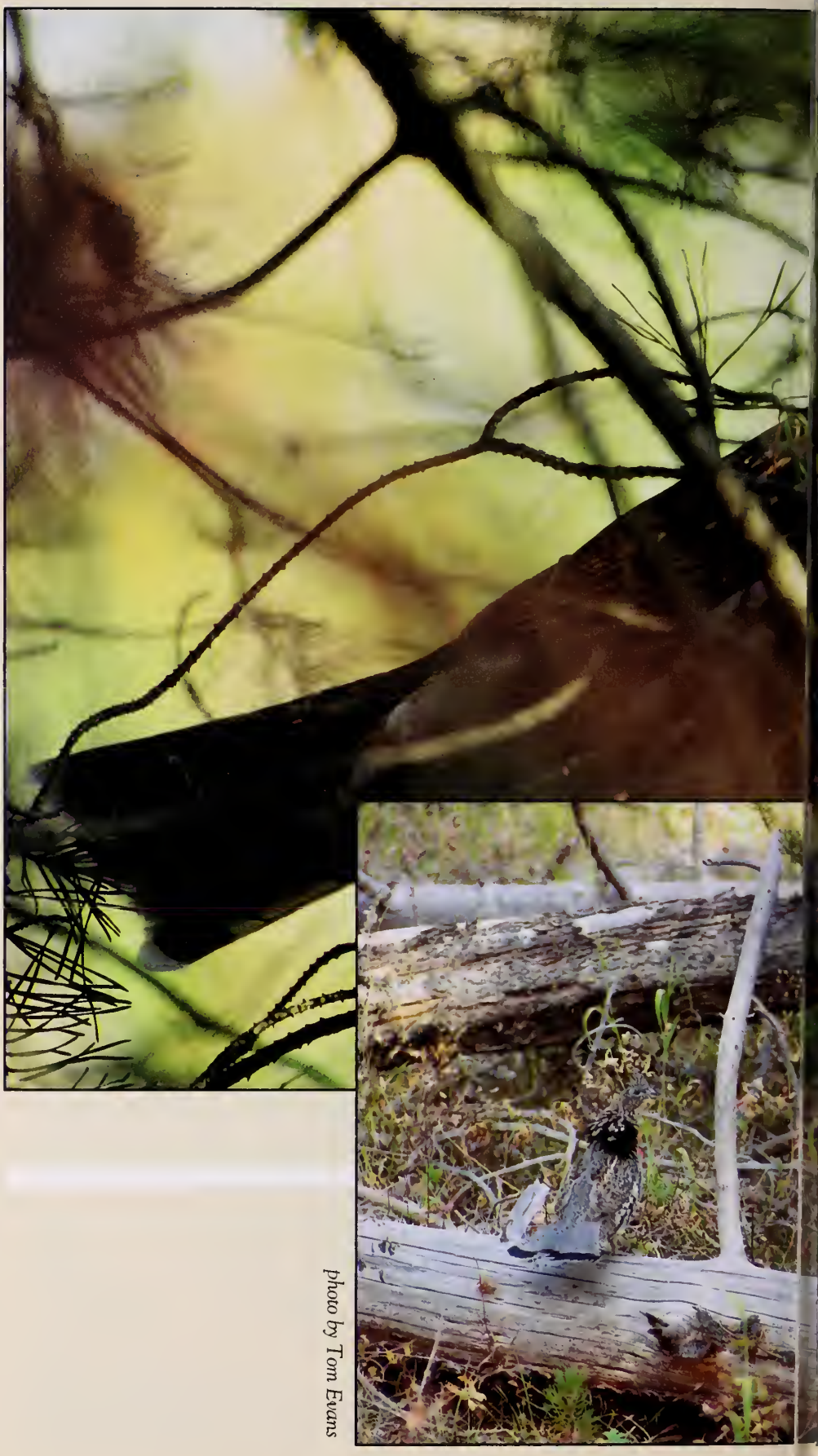


photo by Tom Evans

photo by John Coffman

Ruffed grouse in Virginia is a bird of our young forests. Although more common in the Blue Ridge and Alleghenies, this bird's range extends throughout much of the northern piedmont. The bird's mating season begins early in the spring with the male's courtship displays and the famous "drumming" performances. A "drumming" log is a prerequisite for this display, like the one pictured left.

summer their diet variety increases to include green leaves and other soft, wild fruits. In the fall they shift to hard and soft mast producing trees and shrubs. Acorns, greenbrier, grape, and dogwood are common foods. In the winter and spring when these foods get scarce, they shift to Christmas fern, mountain laurel, greenbrier, and honeysuckle.

Grouse broods frequently break up or disperse in the fall in a behavior that has been described as "crazy flight" or "fall shuffle." At this time young birds may leave their brood range in seemingly undirected flights into unfamiliar areas.—G.N.

American Woodcock

The American woodcock is perhaps Virginia's least recognized and utilized upland game bird. The migratory woodcock is secretive in nature and specialized in a narrow range of habitats, making its existence unknown to many. The woodcock is technically classified as a shorebird; however, evolution has taken this game bird from the mud flats and marshes to moist upland habitats. Like many of its shorebird relatives, the woodcock uses its long, pointed bill to forage for invertebrates on the soil surface and below. The former scientific name of the woodcock, *Philohela minor* (recently renamed *Scolopax minor*), means little lover of swamps and bogs. These habitats are not easily produced and are facing tremendous pressures from development. Recent trends in land development are, in fact, thought to be the primary cause of a long-term decline in woodcock population numbers. Concern for the species has led to a Federal Woodcock Management

The American woodcock is facing hard times, as its preferred wet habitats are declining because of draining and development. Woodcocks do breed in Virginia, though the majority of the birds breed farther north in New England and Canada. A lover of earthworms, the woodcock uses its long pointed bill to dig them up out of soft, moist soils; photo by Joel Arrington.

Plan, calling for the protection and development of young, moist forest lands. The document identified Cape Charles, Virginia as one of three critical wintering areas for woodcock in the Eastern Management Zone.

Although woodcock breed in Virginia, their greatest distribution and density is seen further north in the Lake and New England states and the Maritime Provinces of Canada. The fall migration in the north usually begins in late September and continues through December.

Weather influences woodcock migration to a great degree with cold, ground freezing weather fronts producing "flights" of woodcock. The earliest migrations typically pass through the mountains in greater numbers in late October and early November. In the piedmont region, woodcock numbers are thought to build through November and decline progressively through December. The tidewater area probably enjoys the greatest duration of migratory woodcock, from November through January.

By late January and early February woodcock begin their return to their breeding grounds. The males arrive first at the breeding grounds and shortly thereafter set up courtship or "singing" grounds. These areas function to attract females for breeding through unique courtship displays. The displays take place at both dusk and dawn, usually in an old field or other forest opening, and last from 30 to 60 minutes in length. Individual birds exhibit a fidelity to a particular displaying or singing ground and may return to the same ground year after year.

Both sexes are mottled brown in color which serves as an effective camouflage. Females nest on the ground with a well-formed cup and usually lay 4 eggs. The eggs are incubated for 21 days and the peak of hatching generally occurs in late April and May. The precocial chicks are hatched with equally protective coloration and in 4 weeks are nearly full grown. Earthworms constitute 50 to 90 percent of their diets along with other invertebrates like beetle and fly larvae, arthropods, and other insects.—G.N. □

Irv Kenyon is a Department wildlife biologist assistant. Gary Norman is a Department wildlife research biologist.

Bobwhite in soybeans; photo by Maslowski.

Tending The Farm

by
Stephen Capel

Management techniques can bring rabbits and quail back to your farm.

It's no secret that farm game species in Virginia have been on a steady decline for many years. Virginia is not alone; all throughout the eastern seaboard and south, quail numbers have been declining. The reasons are many, and the concerns for the future of quail and rabbits are valid. Is there any hope for the future? The answer is yes—but before we consider habitat management approaches that can help offset these declines, it may be worthwhile to review what has happened in Virginia over the last few decades.

In 1930 there were 187,000 farms in the Commonwealth, declining to 165,000 in 1950. A dramatic change in agriculture occurred in the next 30 years, and by 1980 there were only 50,000 farms remaining. There was only a decline in the number of acres farmed from 17 million to 9 million, however. Thus, farm size increased substantially. This occurred as farming intensified—farm, chemical use increased, double cropping was practiced, much larger equipment was used, and field size increased (with the resultant loss in hedgerows and odd areas).

At the same time, the number of livestock almost doubled. This was almost entirely due to marginal cropland being seeded to fescue. A lot of those marginal acres previously hosted coveys of quail as they laid fallow. Fescue has been good for the livestock industry, but otherwise it is a biological desert—no self-respecting critter lives in a fescue patch of its own choice.

Marginal fields not sowed to fescue were planted in loblolly pine. At least loblolly pine offers quail a decent home for the first five or six years. As a matter of fact, were it not for logging cutovers, quail would be in much worse shape today. Unfortunately, the next 30 years of a loblolly plantation's life can be a bit bleak for quail and bunnies.

During this same time, many other changes were occurring in Virginia—the state's population was doubling. That placed a lot of pressure on odd areas and even good farmland in the vicinity of our urban areas, not just for housing, but also roads, shopping centers, industries and office parks. More quail habitat bit the dust.

In fact, quail habitat went from commonplace to the point where there were just islands of quail cover, with lots of countryside in between that no covey would call home. Quail in these islands were more susceptible to disease, weather, predation, hunting or other damaging impacts, and without corriders of habitat to move through, the likelihood of surrounding populations being able to contribute to their recovery was greatly diminished. Furthermore, if you drive six or eight miles down the road without seeing any decent place to turn out your dogs, chances are that hawks, foxes and other hunters are equally astute. This focuses a lot of attention on these islands of good habitat, usually to the detriment of the covey.

The solution to the decline of quail is in returning Virginia to a place where there is more continuous habitat for farm game. This is where you can have an impact. There are a variety of actions that can be taken on almost any acreage that will improve conditions for rabbits and quail. Let's start with quail; a lot of these ideas will also help rabbits and nongame species as well.

Both quail and rabbits are creatures of disturbed lands, hence they thrived on the old-time farmlands of Virginia. Anything you can do to stir the soil, disturb the plant community, or set it back will probably help. Thus, the main tools in a quail manager's kit are the disc, drip torch and bush hog mower. After that you can put the icing on the cake with trees, grass and food plot plantings.

Edge

Farm game is typically associated with edge. Edge is where two different cover types meet. As you employ the different management techniques, try to do so in a manner that will create as much edge as possible. This means following the contour—curves rather than straight lines. Anything to add an irregular pattern.

You can often improve upon an edge by widening it out—with a strip food plot, with a row or two of shrubs or with a grass or legume strip. The wider the edge, the better. Once an edge is over 30 feet wide, the ol' fox has a harder time finding that quail nest. Anything much narrower, and you may be setting the hen up for someone else's dinner. This is a good reason not to rely entirely on edges as your habitat development—occasionally you need some clumps or patches of cover, especially nesting cover to provide the quality and security for safe nesting.

Discing

Probably the best tool for quail management is the disc. It will take the land back to mineral soil. Our department has experiments underway at present to determine the best time to disc to get the best mixture of quail food and cover. Typically, spring discing appears to produce a somewhat better mixture.

You can go into a discing rotation to produce more edge and different cover types. Ground disced the first year produces annuals that are at the top of the quail's gourmet diet list. In the second year, you get more broomsedge, goldenrod and other perennials that are attractive nesting areas and bugging areas for young broods. The third year is even better "old field" nesting cover. By the fourth year, you need to take a close look. If the sweet gum, tulip poplar and winged elm are starting to show up, hit it with the disc.

Take that piece of ground that you are contemplating carrying out disc management on, and divide it into thirds. Disc 1/3 this May, disc the next 1/3 in 1991, and disc the final 1/3 in 1992. You can often do this when you are going to or coming back from other field work without having to make a special trip.

Prescribed Fire

Perhaps the most neglected tool in the Virginia quail manager's kit is the match. Prescribed fire is an effective and almost necessary tool in many situations. Quail spend virtually all

Prescribed burning can be used on overgrown fields with thick cover to bring back legumes, a desirable food for quail and rabbits. Fire eliminates the woody vegetation and allows the manager to maintain open land rather than forests. For best results, burn annually only a portion of your open land on a 3-4 year rotation during January and February. Most landowners need the assistance of a forestry consultant to burn their land safely, photo by Jerry Sims.

Periodically discing and plowing strips is a technique that can be used to renew the vegetation needed by small game. It is important to develop a discing schedule on your land which will allow a different portion of the field to be disced every year, while allowing other areas to lay fallow for two or three years. Planting of seed is unnecessary in these areas, as preferred native vegetation will naturally occur; photo by Jerry Sims.

A model small game habitat is the result of planned burning and discing—and time. Wildlife management is not accomplished overnight. In order to manage your land, you must have a plan, implement it, and over time you will see the results; photo by Jerry Sims.

of their time on the ground. They can't fight through heavy ground mulch or litter. They like a lot of upright stems to move between, offering overhead protection from predators, and access to seeds on the bare ground.

When the ground is covered with a mat of vegetation or when a sod has developed, it is time to get out the drip torch, and prepare for a prescribed burn. Quail food plants will respond to fire by increasing seed set; nutrients tied up in standing, dead vegetation will be recycled; the vegetation that prohibits free ground movement by quail will be opened up; and invading woody species like sweetgum will be set back.

From a quail's standpoint, there may very well be no such thing as a bad fire; however, your neighbor may have a different idea. Thus, you need a prescription and plan for your burn to make sure that it will do what you want, that it will stay where you want it, and that the smoke will go where you want it to go. Careful planning and preparation before a burn is *absolutely* essential. Seek help from a skilled professional before proceeding.

Disc and Burn

Teamwork is the key to success in many fields. Try teaming up discing and burning. You will get a wider variety of habitats in the same area, which will benefit the critters with more edge and diversity.

I like to pick out a 2 to 5-acre neck in a larger field that dips back into the woods for this kind of management. The idea is to break up the patch into about three pieces. Management then begins with a late winter/early spring discing around 1/3 of the patch. Make two or three rounds with the disc, double discing to insure that little cover is left. This disc strip will serve as the "wild food plot" for one to two years and will also serve as your fireguard.

Next you would burn the patch remaining inside the disced area in later winter or early spring (if you burn after March 1, you will need to wait until after 4 p.m. to comply with the burn laws). This will produce ideal brood rearing cover and roosting cover for the coming year. The remainder of the area should be good nesting, feeding and loafing area.

The following winter or early spring, disc around the second 1/3 of the parcel. Follow this with a similar early spring burn within the disced areas. You will have created new brood and "wild food plot" areas, and the first year's disc area should still be providing food, while the first year's burn area is now your better nesting cover.

The third year, disc around the remaining area, and follow with a burn within that disced area.

As you approach the fourth year, you will need to evaluate the condition of the first year's work. Are the disced areas still producing ragweeds, partridge pea, pigweeds, beggarticks (the ice-cream of quail foods) or has it begun to support goldenrod, broomsedge, and become invaded with sweetgum, maple and winged elm? Is the interior (1st year's burn) beginning to be choked with blackberry, elm, sweetgum? If brushy/woody plants are starting to get a good foothold, you will need to begin the cycle again. If you still have good annual weed production in the disced areas, and woody invasion is moderate, you can probably wait another year before discing and burning the year-one portion.

Permanent Plantings

It is easier to manipulate cover that is already present to improve the quality of quail and rabbit habitat than it is to develop new habitat. Occasionally, however, you need to "sweeten the pot" by adding a new cover type. In this case, it is much better to add permanent vegetation than to replant annually.

Shrubs can add soft edge between open lands and woodland and offer food, escape cover and travel lanes for critters while adding a colorful landscaping touch (and maybe an opportunity for fruit for homemade jams, jelly and syrup as well). The backbone of quail and rabbit plantings should probably be VA 70 lespedeza. It is excellent fall and winter food, and offers pretty good cover as well.

From there you can add such shrubs as tatarian or rem-red honeysuckle (this is a shrub type, not vining), indigobush, American plum, silky dogwood, sargent crabapple, chokecherry or bessey cherry, or one of the viburnums. In some parts of the state, you might want to add autumn olive, serviceberry, spicebush, or bayberry.

Don't let the plantings become long, narrow and monotonous. Add 10 to 15 shrubs of a different kind every now and then. *Remember*: variety is a big key in attracting more wildlife of *all* kinds. Stop the shrub row every now and then and plant some lower, grassy or legume cover. Then start the shrubs again.

Warm season grasses offer an excellent way to add quality nesting cover. These grasses are also excellent for grazing or haying, especially as summer "replacements" for fescue. Switchgrass and weeping lovegrass are probably the easiest of the warm season grasses to establish. They can be seeded into an alfalfa-type seedbed in late spring to early summer. Big bluestem, indiangrass and coastal panicgrass are a bit more difficult to establish. They can be broadcast into old row crop stubble or a prepared seedbed, and then incorporated *lightly* by dragging a cultipacker over the plot.

The better varieties for Virginia are: cave-in-rock or Kanlow switchgrass (shelter switchgrasss is excellent wildlife cover but poor for forage), rumsey indiangrass, niagara or rountree big bluestem, Atlantic coastal panicgrass (good cover, fair forage), and all varieties of weeping lovegrass are pretty good. Contact your local district wildlife biologist for more information on warm season grass plantings.

Food plots have been purposely left until last. Most folks in Virginia believe farm game habitat management starts with food plots. In many cases this is about the last thing that needs to be done, since there is plenty of waste grain and wild foods around

Except for dove hunting, artificial plantings are largely unnecessary for other small game species if you intensively manage your native vegetation; photo by Larry Ditto.

the farm. In fact, one food plot of 1/2 acre for every 100 acres of quail habitat will suffice to bring the birds through that "once-in-10-years" rough winter. Additional food plots should only be added after other habitat work is completed, since you must have successful nesting and brood survival first.

The easiest way to produce a food plot is to leave a patch of standing grain adjacent to quality cover, such as a honeysuckle fencerow or a woodland edge. Perennial food plots offer the next best alternative. A mixture of 3 lbs. milo and 5 lbs. bobwhite soybean has proven to be a good combination. The bobwhite soybeans persist at least five years in most piedmont and coastal plain areas—some at our Amelia Wildlife Area have endured even longer.

If you have an odd area or a pine cutover, Korean lespedeza is good quail food. It can be broadcast in late winter through early March at about 10 lbs. per acre. Quail really use it heavily, but Korean is not tall enough to offer food in snow cover.

A variety of plants are used in annual food plots—corn, sunflowers, various millets, grain sorghum (milo), and buckwheat are among the most popular. They are planted alone or in various combinations. Mixtures seem to be a little more successful, again, because of the diversity and the differing degrees of drought-hardiness of these plants.

As you finish reading this, it might be a good idea to give some thought as to how you can plug some of these practices into your favorite small game covert. Actually, your favorite patch is probably already in fair shape, so what about that patch you always thought should produce more critters than it does? Can it be fine-tuned with one or more of these practices? It may just need one piece of the puzzle to complete the picture—and put bunnies and bobs back in that old honeysuckle hedge! □

Steve Capel is the habitat coordinator for the Wildlife Division.

A Model to Farm

Good hunting follows good habitat. It may take some time to make your farm favorable for small game, but it will be worth it; photo by J

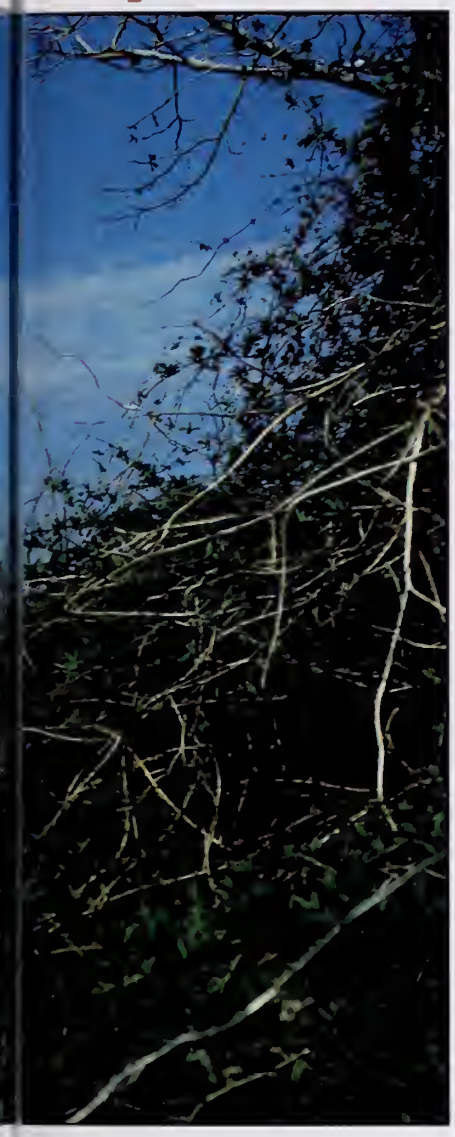
White Oak Mountain Wildlife Management Area

"The central thesis of game management is this: game can be restored by the creative use of the same tools which have heretofore destroyed it—axe, plow, cow, fire, and gun."

Those words were penned by the acclaimed father of wildlife management, Aldo Leopold, more than 50 years ago. Leopold used down-to-earth terms to describe the basic tools needed to manage wildlife food, cover, and wildlife populations. Today's professional wildlife manager continues to use those same basic tools to manage wildlife habitat. The real challenge is to provide the proper mix of habitat types that will meet the year-round food and cover needs of wildlife.

At White Oak Mountain Wildlife Management Area located in the rolling hills of Pittsylvania County, the "axe-plow-fire" axiom is implemented with fervor. The area is composed of some 2700 acres, about two-thirds of which are forested. The remaining one-third "open land" is

By



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by
Jim Bowman
and
Joey Robertson

intensively managed to provide a gradient of early plant successional stages that favor small game species such as bobwhite quail and cottontail rabbits. This type of habitat provides the year-round food and shelter required by these two species, along with a host of other wildlife. Indeed, many animals such as deer and wild turkey benefit, while also depending upon the surrounding forest community to fill part of their food and cover needs.

Although perhaps "pleasing to the eye," artificial plantings are largely unnecessary at White Oak Mountain due to intensive management of native vegetation. With the exception of about 50 acres of dove management fields that are planted to small grains and sunflower, artificial plantings are primarily limited to perennial species such as lespedezas.

A combination of prescribed burning, discing, and mowing, plus a small amount of planting, are the practices used to manage plant succession at White Oak Mountain. About one-third of the open acres, or approximately 300 acres, are treated each year. Treatments are not done in a single large block, but rather are installed in a patchwork of smaller units distributed throughout the management area, thus creating diversity. This rotational system insures that each acre is treated at least every third year in order to retard natural plant succession.

Prescribed burning during late winter is one of the most valuable management practices used at White Oak Mountain because it is relatively inexpensive and it promotes desirable food and cover conditions. Up to 300 acres are prescribed burned each winter in blocks ranging in size from 2 to 50 acres. These sites are further enhanced following the burn by top-seeding strips of Korean lespedeza, a seed producer highly favored by quail. In addition, the disced firelines bordering each burn unit are seeded to wheat and Korean lespedeza. Some areas, such as valuable hedgerows, are protected from burning. Fire not only retards natural succession, but it also promotes the growth of valuable native quail foods such as beggar-ticks, native lespedezas, and a variety of other annuals. These are most abundant the first year following the burn but are rapidly displaced by less valuable vegetation thereafter.

Discing is also employed to stimulate production of desirable food and cover plants, plus to kill invading woody vegetation that fire alone does not control. Periodic mowing is used on some sites where burning or discing is not feasible.

Carefully planned timber harvests also provide an abundance of early successional vegetation. In addition to the native plants and woody sprouts that quickly respond, haul roads and log landings are planted to perennial grasses and lespedezas that benefit wildlife for many years following.

Aldo Leopold's simplistic description of wildlife management seems almost out of place in today's complex world. However, in spite of enormous advances in the conservation of wildlife resources during the past half-century, the same basic principles still apply.

There is perhaps no other place in Virginia where those principles are more diligently practiced than at White Oak Mountain Wildlife Management Area. □

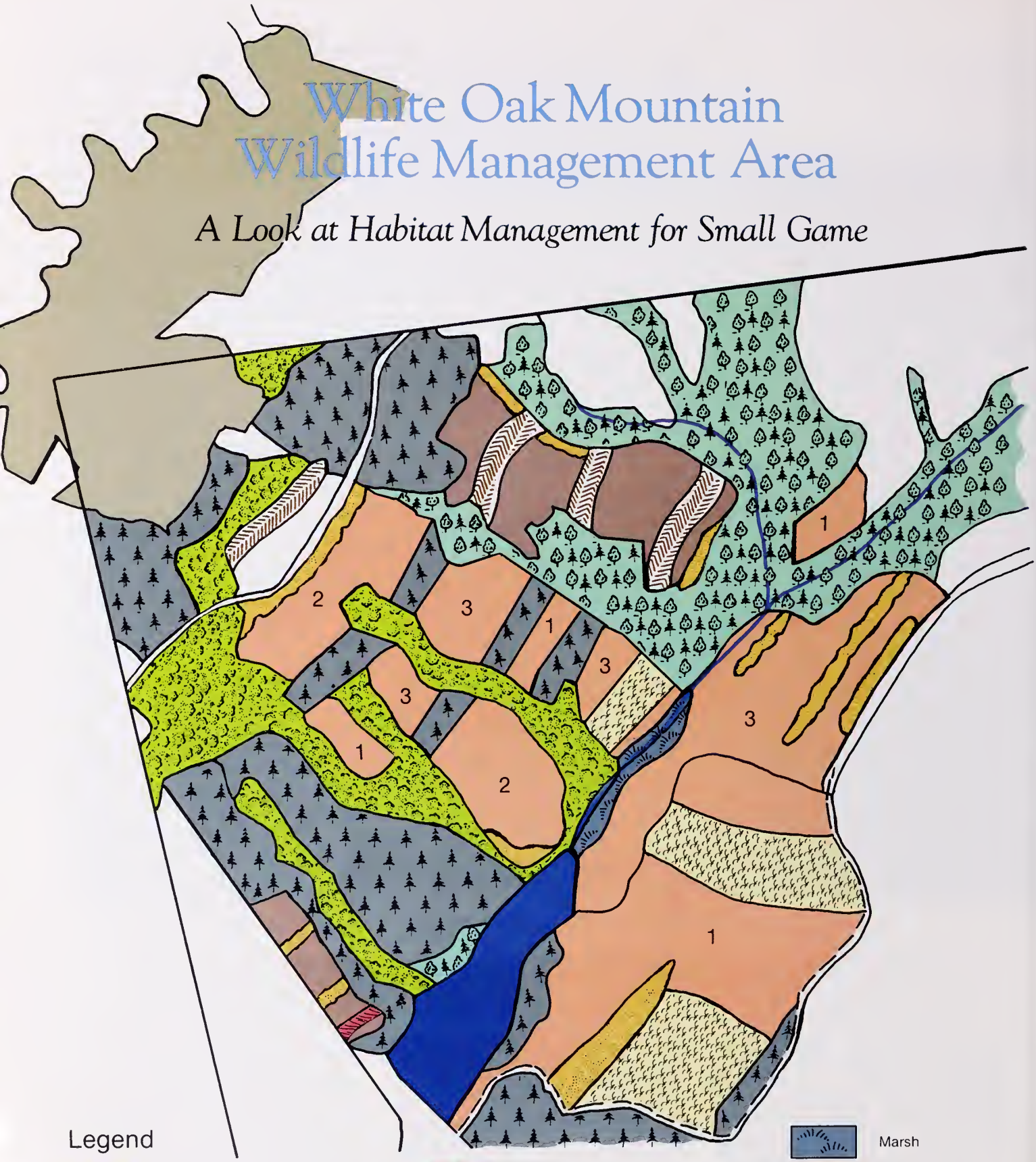
Jim Bowman is the Department wildlife biologist manager for the southern piedmont. Joey Robertson is a wildlife biologist assistant assigned to White Oak Mountain WMA.

Plants on the Move

What is plant succession? Basically, it is the transitional and ongoing process in which plant and animal communities are continually replaced by different types of plants and animals. In one sense, it is the maturing process of a biotic community. It begins with any piece of land that is not occupied with vegetation (such as a plowed field). Anyone who tends a home garden is all too familar with the profusion of "weeds" that rapidly invade vacant soil. If you decided to permanently abandon your garden site, it wouldn't be too long until it would be occupied by taller weeds, then grasses, then shrubs and small trees, and finally a full-fledged forest. The habitat manager strives to manipulate natural processes of plant succession in order to benefit wildlife species that favor particular types of plant communities.

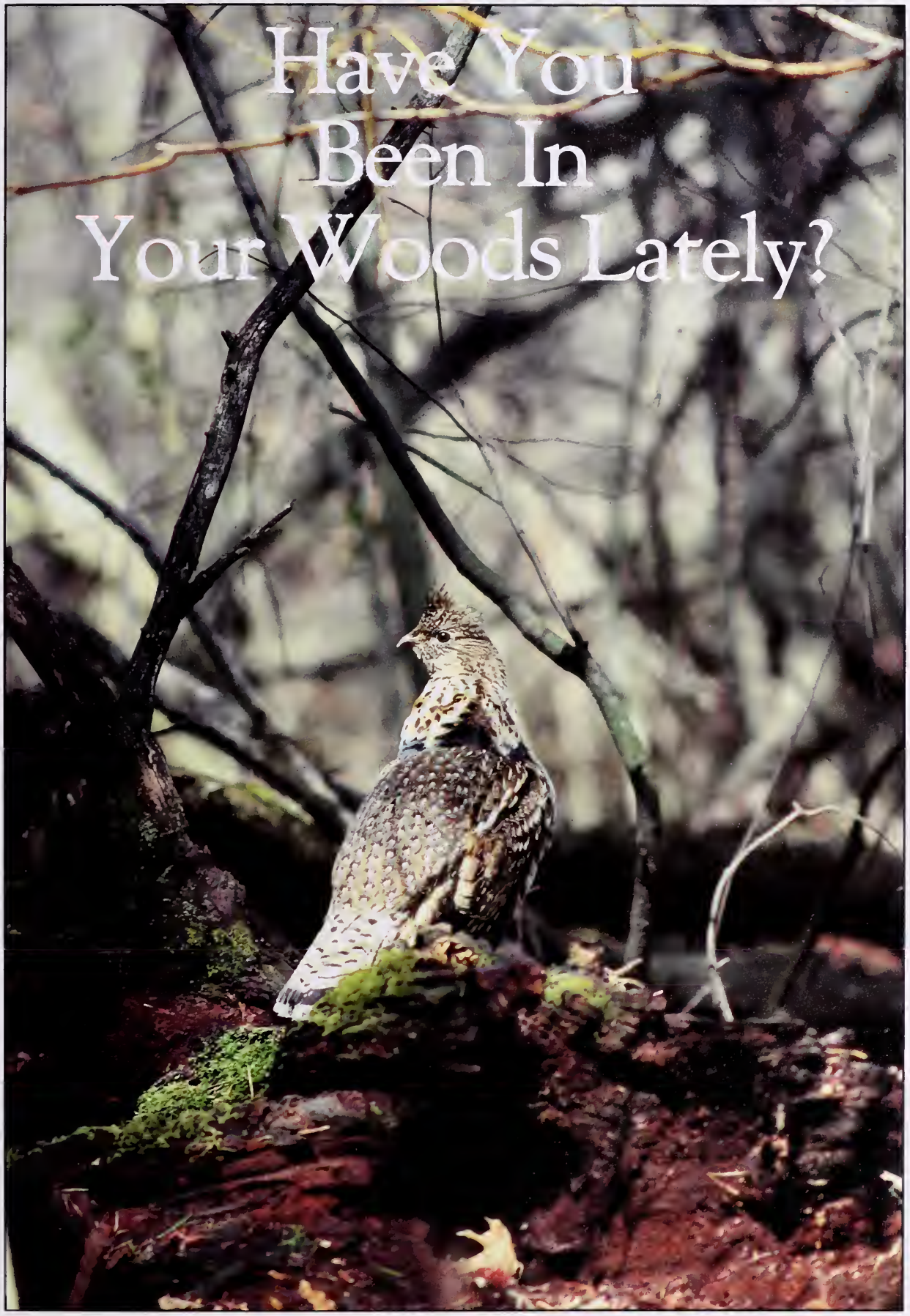
White Oak Mountain Wildlife Management Area

A Look at Habitat Management for Small Game



Legend

- Disced
- Prescribed Burn (showing year of rotation)
- Dove Field (strips of sunflower, millet, wheat and corn)
- Annual Wildlife Food Plot
- Hedgerow/Shrub Lespedeza Border
- Fallow Field (Burned or disced within 3-yr. rotation)
- Marsh
- Pine
- Yellow Poplar-Pine
- Pine-Oak



Ruffed grouse, a species to manage your forests for; photo by Gregory K. Scott.

by John Baker

Forestlands occupy 61 percent of Virginia's landscape. Surprising as it may seem, *sixty-four percent* of these woodlands are in *private* ownership. This means that as temporary custodians of these woodlands, landowners have a great responsibility in meeting management goals that reflect stewardship—wise use without abuse.

Forest management techniques are as diverse as the variation among forest stands, and are limited only by one's time, resources, and creativity. Your parcel, no matter how large or small, is an essential part of an interrelated web of life that functions in accordance to physiological, chemical, and biological principals representative of your region of Virginia. Treatments that you make may have a beneficial, negligible, or harmful effect on wildlife. As a land manager, your judgment of the importance of how your real estate fits into the "big picture" has a tremendous bearing on whether you are successful in meeting your goals.

If your interest sways toward producing small game habitat for aesthetic and recreational benefits, you must develop a plan. Ask yourself two questions: What is the current condition of the habitat, and what are the limiting factors of the habitat? In other words, develop an inventory to determine what is absent from the habitat requirements of the featured species. Utilization of maps, aerial photographs and/or a walk around the neighborhood will give you insight. Recognize the intended plans of adjoining landowners, locations of key wildlife areas such as forest openings, wetlands, spring seeps, den trees, evergreen thickets, etc., and record the extent and location of habitat components, keeping in mind that predictable vegetation changes will occur over time.

In Virginia, food and cover encompass the primary habitat needs of forest dwelling upland game, including grouse, woodcock, and squirrels.

Private landowners with forestlands can benefit small game by practicing good wildlife management on their property.

Timber management for squirrels requires planning for a diversity of hard mast production by encouraging such species as red and white oaks, hickory, beech and walnut; photo by Lloyd B. Hill.

Woodcock favor forest openings near early successional and shrub plant communities for mating displays and nesting and brooding habitat; photo by Lynda Richardson.

Thus, landowners must consider their ability to conduct forest management activities on a repeated basis to provide enduring favorable habitat conditions. This may occur annually, every five years or even 150 years, depending on a particular forest stand. Habitat treatments may not immediately respond in producing the positive characteristics that you envision, though. Some may take many growing seasons, while others take only one season. Small game, however, generally respond quickly to favorable habitat conditions, particularly if there are parent individuals occupying the area.

Now that you are aware of the considerations challenging landowners, let us investigate the techniques to improve your piece of the local habitat condition. Grouse and woodcock predominately occupy the edge of deciduous hardwood and hardwood-conifer mixtures containing early successional and shrublike plant communities. Grouse would have only minor management potential in an isolated woodlot that was separated from continuous forest. Woodcock favor similar areas, particularly those having deep soil, alluvial floodplains, and streamside zones productive in earthworms—their primary diet. These birds are compatible, to a degree, with short timber harvest rotations. Gray and fox squirrels need maturing nut and berry producing hardwood stands containing cavity den trees. Fox squirrels favor the forest edge while grays will utilize edge and interior habitats. Each of these four species will take advantage of interspersed evergreens for cover.

Ruffed Grouse and Woodcock

As grouse hunters are well aware, the birds require heavy "overhead" cover, 8000-plus sapling stems per acre (about a shoulder width or less apart), and a variety of buds, leaves, seeds and insects for food. Woodcock are migratory, but Virginians enjoy their presence year-round. Springtime courtship antics by males attempting to dazzle their potential mates set the stage for renewing annual population losses from the previous year. The "singing grounds" occupy openings near early seral and shrub plant communities also favored as nesting and brooding habitat. They prefer medium to light "overhead" cover containing an open understory and light litter accumulation which does not impede nocturnal feeding activities. Production of this cover type on fertile, moist soils maintains resident populations and attracts migrant birds arriving in late October. Striving to apply the following management considerations would be beneficial to grouse and woodcock:

- Fencing to remove livestock from forests and shrublands. Protecting streamside zones bordering pasture and wet pastureland also will be advantageous and promote improved water quality.
- Harvesting mature forest in an uneven manner by rotating treatments proportionately over the expected life of the forest, utilizing selective cuts, clearcutting in 5-20 acre irregular shaped units, and/or linear strip cuts to maximize maturing forest-to-regenerated forest edge. Retain beneficial tall shrubs producing grouse foods such as ironwood, witch-hazel, dogwood, hawthorne, and serviceberry in cutting units. These treatments usually provide good habitat characteristics the first three years of regeneration, developing to excellent at 4-15 years, and declining thereafter.
- Providing dense evergreen clusters, in clumps or strips, of less than one acre each among immature hardwoods and not to exceed 10 percent of the tract. If absent, pines may be directly planted on a 6′ x 8′ spacing (about 900 seedlings per acre) and consideration should be given to the presence of rhododendron and laurel species as an inherent substitute.
- Enhancing the availability and vigor of wild crabapple, hawthorne, apple, wild cherry, dogwood, hazelnut, wild plum, grapes, greenbriers, witch-hazel, alders and ninebark by removing competing overstory trees. If they are absent, direct planting may be an option on sites where exposure to direct sunlight exists beyond the drip-line edge and shadow of the forest canopy in openings. Additional available food and cover plants may include bush honeysuckles, indigobush and viburnums. Successful plantings should be arranged in strips or clumps from 30 to 60 feet wide. Sod competition should be reduced at

planting time either through cultivation or herbicides.

- Maintaining the potential production of acorns for grouse, particularly those trees producing the small nuts as found on scarlet and bear oaks, over the expected life of the forest by insuring oak regeneration during the rotation of stand treatments. Acorn production in Virginia is generally erratic with good to excellent crops produced every two to three years on trees 30-plus years of age. Maintaining the vigor of oaks by the removal of competing hardwoods along with adequate spacing between acorn producing crowns will enhance the nut production per tree.

- Stabilizing drainage patterns and seeding disturbed soil in a legume-grass mixture such as 3 lbs. white or red clover/15 lbs. orchardgrass per acre. Kentucky 31 fescue should be avoided except in highly erodible circumstances. Maintenance of these openings through mowing enhances the trails, roads and forest clearings as brooding and dusting habitat.

- Avoiding the draining of wetlands, dredging stream channels, or impounding stream bottomland and swamp forests to protect key woodcock feeding areas.

- Additional "treats" for ruffed grouse might include: providing a drumming log at least 10 inches in diameter per 10 acres located in sapling cover. Partially cutting individual trees will produce a "living" blow-down for creating horizontal, bushy cover where it is lacking. Daylighting, or cutting trees shading sod openings will remove sun and nutrient competition dominated by the trees and provide escape cover for broods feeding along the clearing edge.

The overall objective in producing habitat for these elusive birds is to spread small forest regeneration cuts and intermediate treatments over as much of their range as possible.

Gray and Fox Squirrels

Annual squirrel reproductive success and survival is dominated by the fall-winter availability of favored hard mast (nuts and seeds) and suitable denning sites. Therefore, management plans for maintaining high squirrel populations should provide for a diversity of hard mast producers and an adequate spacing of den sites for the full utilization of habitat. The mast of heavy-seeded tree species such as red and white oaks, hickory, beech, walnut, dogwood, and blackgum are preferred foods. Cavities which are at least six inches in diameter and have 3-4 inch openings are preferred den sites, serving as a "home base" while utilizing the nuts, berries, seeds, buds, bark, roots, flowers, and mushrooms available in the vicinity. Leaf nests serve as a poor substitute for raising litters and home ranges are generally less than 500 feet in diameter.

Additional key habitat components include tree-lined fencerows between isolated woodlots and hardwood stands isolated by pine forests. Based on the current status of your woodland inventory, consider the following management guidelines and techniques for improving squirrel habitat:

- Protect and enhance the canopy position of walnut, beech, red and white oaks, and hickories during stand thinning treatments until maturity. Weeding and crown release cutting to remove competition and to reduce stump sprouts to one or two stems should begin at about 10 years of age. Intermediate thinnings allow removal of up to 40 percent of the stand and should maintain less than three-fourths full sunlight exposure to the crowns of selected leave trees to prevent the development of epicormic or stem branches.

- Harvest mature forests in an uneven manner by rotating treatments proportionately over the expected life of the forest, using group selective cuts or clearcuts up to 20 acres which have a width not to exceed 500 feet, and are not adjacent to stands which are less than 30 years of age. Clearcutting mature and overmature hardwood stands should not occur until there is adequate advanced oak regeneration (at least 3-ft. high saplings) existing in the understory.

- Retain or provide denning sites at 2-3 per acre in stands greater than 30 years old. Advance planning prior to clearcutting to retain existing den trees or a half-acre clump will be necessary, since it takes Mother Nature longer to produce an adequate denning cavity tree than to begin hard mast production on an area. Installing artificial nesting structures would be a more costly and time consuming venture, but certainly an excellent option. On trees of low commercial value, such as sycamore, elms, maples, beech, black-oaks, sweetgum, blackgum or sourwood, stub pruning limbs 4-6 inches in diameter and leaving 5-7 inch stubs at a rate of 10-20 branches per acre will likely speed the development of adequate den trees.

- Enhance the availability and vigor of dogwood, blackgum, mulberry, apples, cherries, and grapes by removing overstory competition or planting.

- Retain trees along fencelines.

- Protect woodlands from *intense* fire and grazing.

- Leaving unharvested corn adjacent to woodland is beneficial. If winter feeding is practiced, corn alone will not sustain squirrels—a 70:30 mixing ration of shelled corn to shelled soybeans is a good supplement.

As many of you may have noted by comparison, the opportunities for managing grouse, woodcock, and gray and fox squirrels may be compatible on the same forestland tract. Many of the long-term habitat treatments are similar and complimentary to the needs of each critter when applied over the life of the forest.

Tailoring habitat improvements to reach your management goals combines scientific and artistic approaches that require investigation, planning and implementation. Success and satisfaction will be measured by healthy small game populations, and will be a testimonial of your land stewardship by the next custodian of your woodland. □

John Baker is a supervising wildlife biologist for the agency in southwest Virginia.

Regeneration cutting is used to improve habitat by diversifying the forest on Goshen WMA; photo by Dennis Martin.

A Model To Cut Trees By

Wildlife management techniques for forests are practiced on Goshen Wildlife Management Area.

by
Gary Spiers and Gene Sours

The 16,128-acre Goshen Wildlife Management Area (WMA) is located in western Rockbridge County, Virginia. Starting at Route 39 in Goshen Pass, the area extends southwesterly across the ridges and hollows of Brattons Mountain and Hogback Mountain to Interstate 64. Elevations range from 1,326 ft. in Goshen Pass to 3,451 ft. on Hogback Mountain.

Small game management on the Goshen WMA is primarily aimed at creating habitat diversity. The most cost-efficient method of creating diversity has been through the harvest of timber. Ideally, 3-5 percent of the area should be in clearings or openings, and 25 percent of the area should be in sapling and seedling cover. Another 25 percent should be pole timber (20 to 40 years old) and the remaining acreage should be mature timber.

Habitat requirements for many forest game species can often be met by creating cutover or regeneration areas where soft mast production will be encouraged. The fruits of dogwood, sassafras, grape, greenbrier, blackberry, and similar plants grow prolifically in cutover areas, providing an important food source which proves even more valuable in the case of oak mast failure. Herbaceous species (grasses, sedges, non-woody plants, etc.) provide an abundance of food in the increased sunlight of openings. Treetops and woody stem growth from stumps provide cover for nesting and foraging and protection from predators. These regeneration cuts are irregular in shape to provide for the optimum edge effect and are located to provide travel zones and buffer strips of older vegetation beween them for wildlife use.

In the pole size timber (20-40 year old trees) a variety of mast trees will be favored by thinning, a type of timber harvest that removes poorer quality trees from the stand. This encourages acorn and other mast production on the remaining trees and allows sunlight to reach the forest floor. Sunlight encourages the growth of legumes and other understory herbaceous materials. After thinning operations are complete, white pines may be planted in small clumps or groups to provide cover, which is particularly important during the harsh winter months.

Hard mast production is important in managing your timber for wildlife. Acorns are a primary food, not only for small game, but for other woodland wildlife as well; photo by Jerry Sims.

Mature timber plays an important part in the overall management of the area. Most importantly, it provides acorns and other nuts and fruits which are a major high energy food source for wildlife. Additionally, the mature trees provide cavities or denning sites where animals such as owls, woodpeckers, squirrels, raccoons, and other wildlife can find shelter.

Another major component of management is the development and maintenance of permanent clearings throughout the Goshen WMA. These openings range in size from .25 acre to 20 acres and are planted to grasses to provide herbaceous cover where turkey and grouse broods can forage for insects, and rabbits and deer can browse on tender succulent grasses. These areas are periodically mowed or burned to control the invasion of woody stem species. Where possible, fruit bearing trees and shrubs such as bicolor lespedeza, dogwoods, spicebush and autumn olive are planted to provide food.

After timber cutting activities are completed, log landings, haul roads and skid trails are seeded to grasses and clovers to control soil erosion. This practice creates a green herbaceous strip in the forested areas and provides additional food and cover for small game.

Roads and road management are another important tool in managing for forest small game. Roads are needed to harvest timber and conduct other management activities and provide access for hunters and others that use the area. Vehicular travel during non-hunting seasons is controlled through a system of gated roads. This gives wildlife protection from too frequent disturbance, particularly during periods of the year when rearing of young is a primary activity.

Wherever possible, access roads are daylighted, which means that all trees 60 to 100 feet from the center of the road are removed. This creates a long, narrow clearing along both sides of the road and the increase in edge effect has been shown to be beneficial to small game.

Finally, to help manage the area more effectively, a Habitat Inventory Study has been developed by Wildlife Division biologists. The computer-based system will allow Wildlife Division personnel to know the timber stand locations, age of the timber stands, density of the stands, the understory types, and other criteria prior to making habitat management decisions. With this information in place, key wildlife areas such as spring seeps, grape thickets and old homesites can be identified, protected and improved, and future management decisions can benefit from more complete habitat information. □

Gary Spiers is a regional wildlife biologist for the Department. Gene Sours is a Department wildlife biologist assistant.

The Bottom Line

Grouse hunters; photo by Joel Arrington.

How are we going to get back to the "good old days?"

by
Jerry Sims

Unlike the sportsman of yesterday who could simply walk out of his back door and find game, today's hunter must devote many hours and drive many miles in order to locate the specific areas that small game call home. Now, productive habitat is scattered in small patches throughout the countryside.

Where have the small game gone? They have gone with the habitat. Even the casual observer notices the acres of fine habitat that are gobbled up by housing developments, shopping centers, and highways; but the subtle changes on our farms and forests are harder to recognize, though they are just as harmful to our wildlife. Today, farms often have little or no suitable small game habitat. Economic necessity often demands that farmers no longer let patches of land go unplowed or ungrazed.

Further, much of yesterday's farm game was found on marginally productive farmlands which have been abandoned and have either been planted to pine trees or have naturally regenerated into forests. The abandoned fields throughout the state provided excellent habitat for quail and rabbits, and for grouse in the west; however, trees eventually shade the forest ground from sunlight and make unsuitable habitat conditions for mammals and birds which find their living on the ground. Only when openings occur in the forest canopy do grouse, quail, and rabbits prosper.

Virginia's Small Game Program

The Wildlife Division's goal in managing small game is to improve populations and habitat statewide. As most of the land in Virginia is privately owned, the Game Department can not accomplish this goal without the active participation of

the citizens of Virginia. The Department recently initiated a program designed to reverse the long-term decline in good small game habitat on private and public lands throughout the Commonwealth. This program involves individuals, organizations, and other public agencies. We have developed seven major objectives of Virginia's Small Game Management Program:

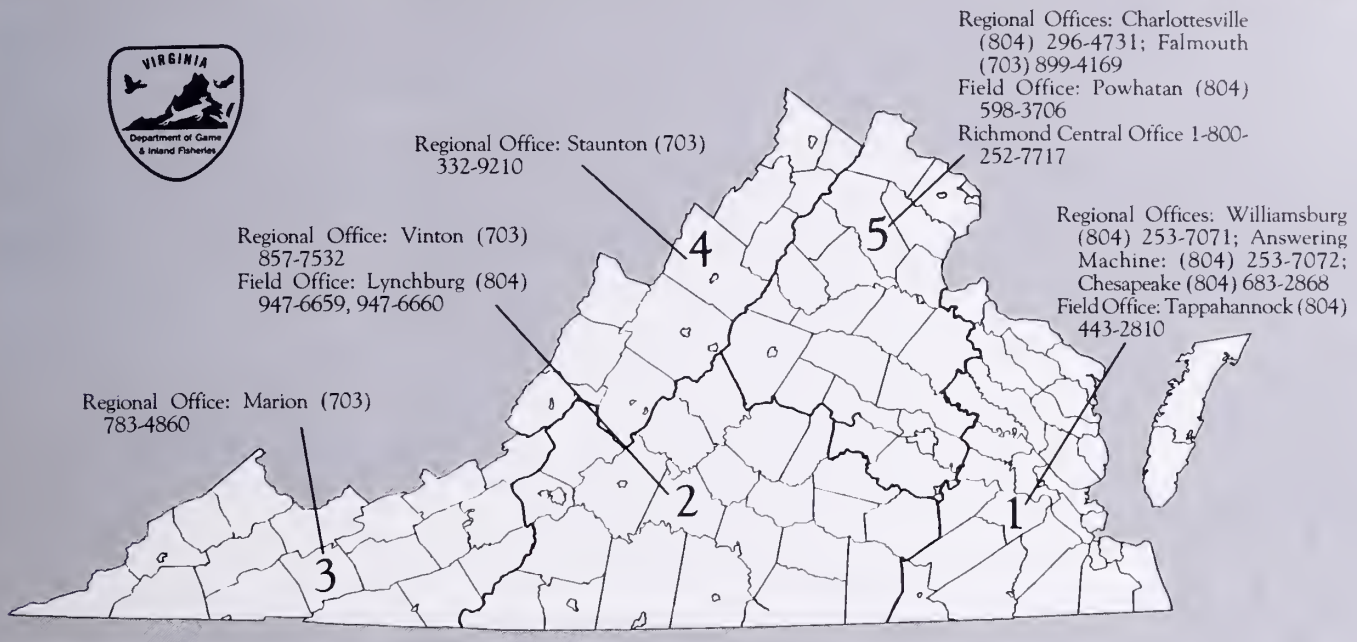
1. To educate and inform landowners, land managers, hunters and the general public about the life history, habitat requirements, and management of small game.
2. To increase the availability of small game technical assistance to landowners interested in managing their properties for wildlife.
3. To optimize small game habitat benefits resulting from state and federal agricultural programs.
4. To increase the quality and quantity of small game habitat on public and private lands throughout Virginia through increased coordination and agreements with other agencies, private organizations, and companies.
5. To increase the accessibility of lands to hunters.
6. To conduct research, surveys and inventories designed to identify the status of and develop management techniques for small game.
7. To determine the influence of pesticides on small game habitat and populations.

Much of this program involves education and technical assistance, since landowners and managers need to know how to manage in order to do the job. If you would like to obtain information concerning habitat protection and development or to arrange for a technical assistance visit to your property, contact a wildlife biologist at one of the Game Department regional offices listed on the following page. The staff will be happy to provide you with information and advice to improve your property for wildlife. □

Jerry Sims is assistant chief of the Department's Wildlife Division.

Small game populations can be increased in Virginia, if private landowners, public agencies and organizations work together to save and create and manage our habitat for wildlife; photo by Joel Arrington.

References and Further Reading


Regional Offices: Charlottesville (804) 296-4731; Falmouth (703) 899-4169
Field Office: Powhatan (804) 598-3706
Richmond Central Office 1-800-252-7717
Regional Office: Staunton (703) 332-9210
Regional Office: Vinton (703) 857-7532
Field Office: Lynchburg (804) 947-6659, 947-6660
Regional Offices: Williamsburg (804) 253-7071; Answering Machine: (804) 253-7072; Chesapeake (804) 683-2868
Field Office: Tappahannock (804) 443-2810
Regional Office: Marion (703) 783-4860
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Call the Virginia Department of Game and Inland Fisheries' regional or field office nearest you for technical assistance in managing your land for wildlife. We're here for the wildlife—and you.

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